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ABSTRACT

A study was undertaken to identify the factor structure of a battery of readiness measures and to demonstrate the concurrent and predictive validity of one instrument in that battery--the Pre-Reading Screening Procedures (PSP). Concurrent validity was determined by examining the correlation of the PSP with the Metropolitan Readiness Test (MRT), while predictive validity was judged by examining the correlation of the PSP with first grade achievement. The readiness measures were obtained for 288 kindergarten children in five schools. Variables included MRT and PSP subtests, chronological age, and sex. In the following year, the Metropolitan Achievement Test (MAT) was administered to first graders in four of the schools. Concurrent validity was examined by correlating MRT and PSP total scores while predictive validity was estimated by correlating MRT and PSP total scores with MAT scores. The PSP was shown to have concurrent and predictive validity with regard to factor structure, PSP subtests were found to have substantial loadings on two factors: one reflecting visual discrimination and memory or visual/motor ability and the other reflecting discrimination and perhaps visual/auditory integration. The PSP was not represented on a factor that appeared to indicate receptive language skills. (FL)

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Factor Structure and Validation of a Set of Readiness Measures

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Factor Structure and Validation of a Set of Readiness Measures

The concept of readiness has had important implications for the curriculum of kindergarten and first-grade. Systematic pre-reading instruction is provided to facilitate the development of reading ability. Readiness tests have been designed to select children with "high risk" in order to provide specialized readiness training and prevent difficulties in beginning reading development. The number of readiness tests that have been published and the great variety of skills they purport to measure require that ongoing efforts be made to identify those subtests that are useful predictors of achievement, and to determine the extent to which several measures are redundant.

The major purpose of this study is to identify the factor structure of a battery of readiness measures. A secondary purpose is to demonstrate the concurrent and predictuve validity of one instrument in this battery, the Pre-Reading Screening Procedures (PSP) (Slingerland, 1969). The PSP has been criticized for lack of evidence concerning validity (Jamison, 1975). This study provides some evidence concerning its concurrent and predictive validity. Concurrent validity is determined by examining the correlation of the PSP with the Metropolitan Readiness Test (MRT) (Hildreth, Griffiths & McGauvran, 1964). The MRT is considered to rank "very high among readiness tests" (Dykstra, 1975). Predictive validity is judged by examining the correlation of the PSP with first-grade achievement.

Procedure

Readiness measures were obtained for kindergarten children from five public schools in one community in May and June. Variables included MRT and PSP subtests, chronological age (CA) and sex. Only

children within a CA range of 66 to 78 months were included. Complete data were obtained for 288 children, 144 boys and 144 girls.

First-graders from two parochial schools in the same community were tested in October. Children within a CA range of 71 to 83 months were included. Data were obtained for thirty-five boys and thirty girls.

In the following year the Metropolitan Achievement Test, Primary I Form A (MAT) (Durost et al, 1962) was administered to first-graders in four of the public schools in May and in the two parochial schools in June. In all, 164 of the original public school children and twenty-nine of the parochial school children were tested.

Concurrent validity was examined by correlating MRT and PSP total scores. Separate analyses were done for public and parochial school pupils because of differences in test administration dates and, consequently, in CA.

MRT and PSP total scores were correlated with MAT scores to estimate predictive validity. Each school was analyzed as a separate group because of the possibility that different instructional programs in the several schools could have produced differences in achievement and in the correlation between readiness and criterion measures.

After determining that the PSP does in fact predict later achievement, readiness measures were factor analyzed. Data on the sixty-five parochial school children were excluded from this part of the analysis. These data were not combined with data for the 288 public school children because of the differences in date of test administration and, consequently, in CA. A separate factor analysis of the data on sixty-five subjects would be subject to considerable random error. Consequently, the factor analysis was restricted to readiness measures obtained on the 288 public school children. Readiness variables included the seven PSP subtest scores, the six MRT subtest scores, CA,

and sex. Principle components factor analysis with varimax rotation was employed.

Results

Concurrent validity of the PSP was found to be satisfactory. Table 1 shows Pearson r's computed for public and parochial school pupils. The r's are of moderate magnitude and significant (< .01). The apparent difference in magnitude may have resulted from the differences in CA and time of year when tested or from random error (which would have greater impact on the value of r for the group with smaller n).

Table 1. Correlation of Pre-Reading Screening Procedures with Metropolitan Readiness Test Form A.

Pupils	n	r	CA Mean (in months)	CA SD
Public Schools	288	.809	72.7	3.32
Parochial Schools	65	.607	78.0	3.16

Evidence bearing on predictive validity of the PSP total test is shown in Table 2. Schools A, B, C, and D are public schools where readiness tests were given in May (MRT) or June (PSP) and MAT's in May of the following year. Parochial schools (E and F) administered readiness tests in October and MAT's in June. The MAT comprises four subtests: Word Knowledge - testing recognition and meaning, Word Discrimination - "actually a measure of phonic ability" (Robinson, 1968), Reading - a measure of sentence and paragraph meaning, and

Arithmetic Concepts and Skills. All correlation coefficients but one were significant and were of moderate magniture. More r's for correlation with the MRT total scores are slightly larger than corresponding r's for correlation with the PSP, suggesting that the predictive validity of the MRT slightly exceeds that for the PSP. Nevertheless, the PSP has demonstrated predictive validity. Moreover, each subtest was found to have predictive validity, although some subtests demonstrated this more clearly than did others.

Factor analysis of the fifteen readiness variables produced four factors. Table 3 lists the variables constituting each factor, with variables arranged in descending order by factor loading in the rotated factor matrix. Variables with loading of <.50 are typically excluded unless a variable had similar loading on two factors. Seven variables have substantial loadings in factor I. All variables measure some aspect of visual skill - i.e. discrimination, memory, or visual-motor ability. Five of these variables are PSP subtests.

Three variables have substantial loadings in factor II. These are CA and two MRT subtests of language comprehension with picture interpretation. The PSP is not represented in factor II to any substantial degree (PSP subtest 5 does have a loading of -.36). This factor may be a measure of receptive language skill which in turn is related to chronological age.

Factor III includes five variables with substantial loading and two with moderate loading. PSP and MRT subtests are about evenly represented. The subtests require the recognition of spoken "names" or of visual forms; most also require association of forms with their names. The factor seems to include discrimination ability and perhaps visual-auditory intgration, but its interpretation at this time is ambiguous.

Factor IV includes only the variable sex, which was related to only one other variable, PSP test 6 (auditory discrimination). PSP

Table 2. Correlation of Pre-Reading Screening Procedures and Metropolitan Readiness Test Form A with Subtests of the Metropolitan Achievement Test, Primary I Form A.

Test	Schl.	n	MAT Wd.Kn.	MAT Wd.Dis.	MAT Read.	MAT Arith.
PSP tot.						
	A	85	.673**	.600**	.541**	.712**
	B	44	.634**	.631**	.603**	.564**
	C	19	.511*	.504*	.666**	.421*
	D	16	.548*	.459*	.555*	.353[a]
	E	15	.696**	.705**	.751**	.739**
	F	14	.698**	.669**	.667**	.662**
Mean of r's			.626	.594	.630	.575
MRT tot.						
	A	85	.670**	.664**	.571**	.745**
	B	44	.566**	.534**	.608**	.613**
	C	19	.585**	.710**	.816**	.477*
	D	16	.656**	.656**	.601**	.486*
	E	15	.737**	.795**	.836**	.849**
	F	14	.720**	.730**	.748**	.688**
Mean of r's			.655	.681	.696	.643

[a] Not significant.

* Significant at .05 level.

** Significant at .01 level.

test 6 had a loading of -.38 in factor IV. It was the only variable on which boys and girls differed significantly (< .01) on a t test; girls were favored.

Table 3. Factors and Constituent Variables.

Factor I. Percent of Total Variance = 20.8
Percent of Common Variance = 35.1

Subtest	Variable Name	Variable Description	Loading
MRT 6	Copying	Copy from model	.74
PSP 4	Vis-Mot-Copying	Copy from model	.70
PSP 2	Vis.Discr. Words	Vis. Discr. from model	.66
PSP 5	Vis.Per.Mem.-Dr.	Copy from memory	.65
PSP 1	Vis.Discr. Let.	Vis. Discr. from model	.63
MRT 3	Matching	Vis. Discr. from model	.54
PSP 3	Vis.Per.Mem.Dis.	Vis. Discr. from memory	.49

Factor II. Percent of Total Variance = 10.4
Percent of Common Variance = 17.6

Subtest	Variable Name	Variable Description	Loading
	CA		-.73
MRT 2	Listening	Assoc.spkn sent/picture	-.61
MRT 1	Word Meaning	Assoc.spkn wd./picture	-.53

Table 3. (Cont.)

Factor III. Percent of Total Variance = 20.5

Percent of Common Variance = 34.5

Subtest	Variable Name	Variable Description	Loading
PSP 7	Alphabet	Recogn.form fr. name	-.81
MRT 4	Alphabet	Recogn.form fr. name	-.79
MRT 5	Numbers	No. forms and concepts	-.64
PSP 6	Auditory Discr.	Auditory discrimination	-.56
MRT 1	Word Meaning	Assoc.spkn wd./picture	-.52
MRT 3	Matching	Vis. Discr. from model	-.46
PSP 3	Vis.Per.Mem.Dis.	Vis. Discr. from memory	-.41

Factor IV. Percent of Total Variance = 7.6

Percent of Common Variance = 12.8

Variable Name	Loading
Sex	.88

Discussion and Conclusions

The PSP is shown to have concurrent and predictive validity. PSP subtests have substantial loadings on two factors: factor I reflecting visual discrimination and memory or visual-motor ability; factor III reflecting discrimination and perhaps visual-auditory integration. The PSP is not represented on a factor (factor II) that appears to indicate receptive language skills. Whether the PSP permits refined measurement of discriminable visual skills or is largely redundant and can be reduced in number of subtests without loss remains for future research.

The thirteen readiness subtests in this study reflect only three

factors. Unless a greater number of factors emerge, batteries of a dozen or more subtests appear to be unjustified.

This exploratory factor analysis has identified four factors among a set of fifteen variables. The authors now plan to investigate the predictive validity of factors I, II, and III. Factor scores that include all variables and scores from only variables with high factor loadings will be employed.

References

Durost, W. N. et al. Metropolitan Achievement Tests. New York: Harcourt, Brace & World, 1962.

Dykstra, R. Review of the Metropolitan Readiness Test. In O. K. Buros, Reading: Tests and Reviews II . Highland Park, N.J.: Gryphon Press, 1975, pp. 156-157.

Hildreth, G. H., N. L. Griffiths, & M. E. McGauvran. Metropolitan Readiness Tests. New York: Harcourt, Brace & World, 1964.

Jamison, C. B. Review of the Pre-Reading Screening Procedures. In O. K. Buros, Reading: Tests and Reviews II. Highland Park, N.J.: Gryphon Press, 1975, pp. 121-122.

Robinson, H. A. Review of the Metroploitan Achievement Tests. In O. K. Buros, Reading Tests and Reviews (I). Highland Park, N.J.: Gryphon Press, 1968, pp. 311-312.

Slingerland, B. H. Pre-Reading Screening Procedures. Cambridge, Mass.: Educators Publishing Service, 1969.